



Surname	Centre Number	Candidate Number
Other Names		2



GCE AS/A level

1072/01

BIOLOGY/HUMAN BIOLOGY – BY2

P.M. TUESDAY, 15 January 2013

1½ hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	9	
2.	11	
3.	10	
4.	10	
5.	10	
6.	10	
7.	10	
Total	70	

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INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

1. The species is the basic unit by which biodiversity is measured.

(a) Define the term *species*.

[2]

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(b) Some data on biodiversity is shown below.

	Estimated number of species		
	Britain	Borneo	World
Latitude (how far North of equator)	53°N	1° N	
Fish (freshwater)	38	394	>8500
Amphibians	6	100	>4000
Reptiles	6	105	6500
Birds (breeding residents)	210	600	9881
Mammals	48	288	4327

(i) Which vertebrate class in the table above shows the greatest biodiversity?

[1]

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(ii) Using the table above, the percentage of the world's species of reptiles found in Britain was calculated as 0.09%. Calculate the percentage of the world's species of reptiles found in Borneo.

[1]

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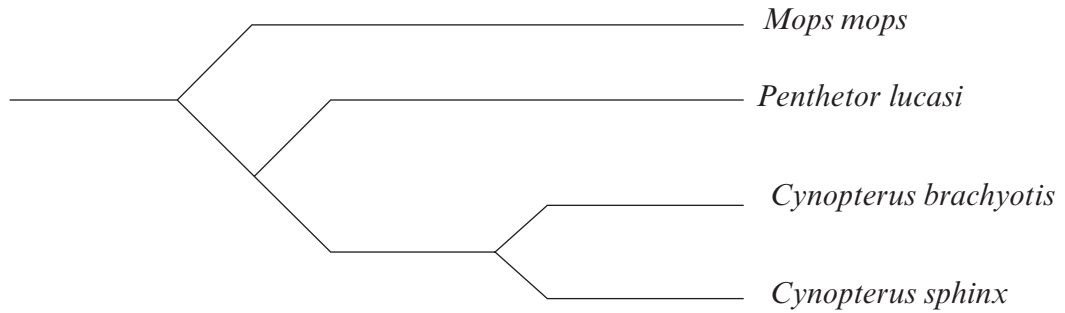
(iii) Describe how the data above confirms the general pattern of biodiversity across the globe, from poles to equator.

[1]

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- (c) There are 288 species of mammals in Borneo, of which 102 belong to the order Chiroptera (bats). The following diagram is a phylogenetic tree showing the evolutionary relationship between some of the bats.



- (i) Suggest, by marking an **X** on the phylogenetic tree above, the position of an ancestor common to *Penthetor lucasi* and *Cynopterus sphinx* but not common to *Mops mops*. [1]
- (ii) What do the latin names of *Cynopterus brachyotis* and *Cynopterus sphinx* tell us about their classification? [1]

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- (d) The wings of bats show similar morphology to the flippers of seals but have completely different morphology to the wings of insects. State the terms applied to structures that show

- (i) common structure but different functions; [1]

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- (ii) common functions but different structures. [1]

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2. In animals gas exchange occurs across respiratory surfaces.

- (a) Describe **three** properties that all respiratory surfaces must possess and explain why they must have them. [3]

Property

Reason

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Property

Reason

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Property

Reason

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- (b) The Flat-headed Frog, *Barbourula kalimantanensis*, is found in fast-flowing mountain streams and is the only known lungless frog.

- (i) Suggest how this frog carries out gas exchange without lungs. [1]

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- (ii) How do the conditions in the mountain stream aid gas exchange? [2]

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- (iii) Give **two** reasons why gills do not function effectively on land. [2]

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- (c) Define counter-current flow as seen in the gills of bony fish, and explain why counter current flow makes gas exchange more efficient. [3]

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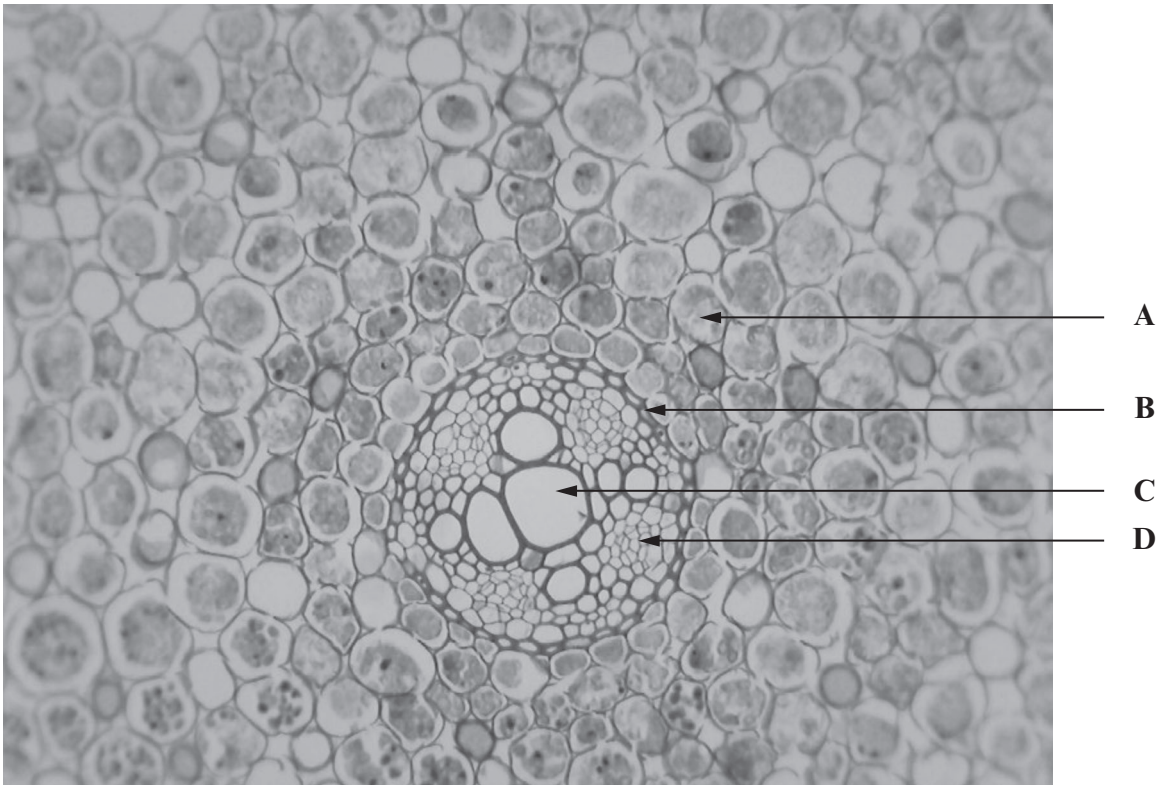
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3. Roots of higher plants contain vascular tissues, the photomicrograph below shows a transverse section through the central part of a buttercup (*Ranunculus sp.*) root.

(a) Name the tissues labelled A-D on the photomicrograph of a root. [2]

A B

C D



(b) Name the tissue shown in the photomicrograph above which is strengthened with lignin [1]

has sieve tubes.

(c) State the function of

(i) sieve tube cells [1]

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(ii) companion cells. [1]

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(d) Some water moves across the root cortex through the vacuolar pathway, from vacuole to vacuole of adjacent cells.

- (i) Name and describe **two** *other* pathways by which water moves across the root cortex. [4]

Name of pathway

Description

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Name of pathway

Description

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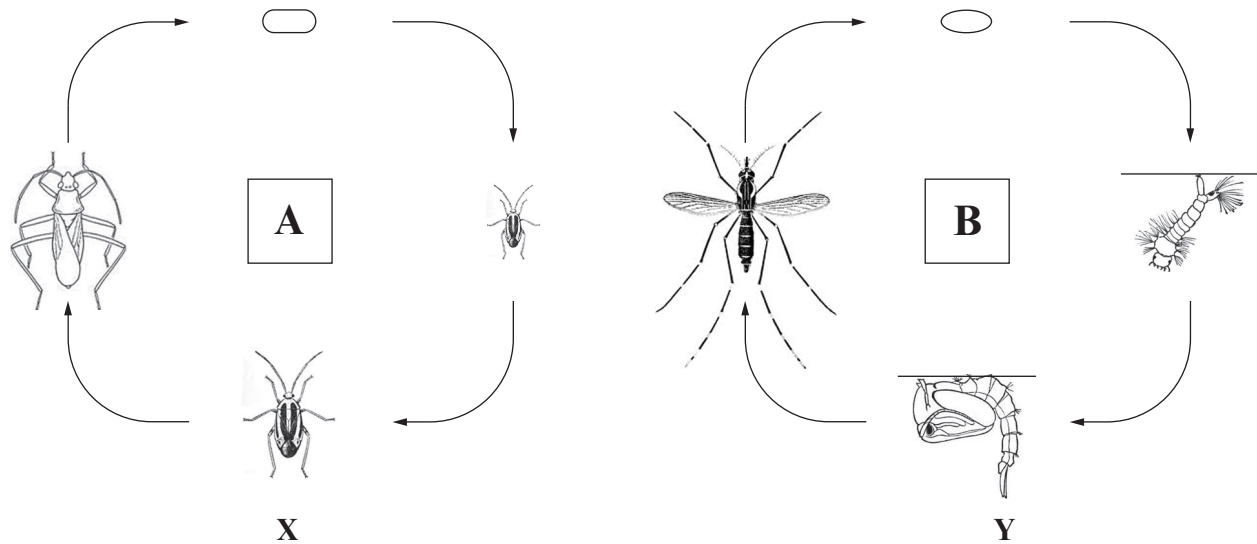
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- (ii) How does the Casparian strip affect the route water takes into the stele? [1]

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4. Insects are amongst the animals best adapted to life on land. Their exoskeleton provides a protective waterproof covering, however it creates a problem for growth. The diagrams below show how insects' reproductive strategies help to overcome this problem.



- (a) (i) Name the types of life cycle shown above. [1]

A B

- (ii) Name the stages X and Y shown in the life cycles above. [1]

X Y

- (b) State why having an exoskeleton is a problem for growth and explain how the problem of growing with an exoskeleton is overcome in life cycle A. [3]

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- (c) Reptiles and birds are adapted to reproduce on land by producing amniote eggs. Describe **two** features of an amniote egg. [2]

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- (d) The development of embryos takes place internally in mammals. List **three** ways in which this is an advantage over externally laid eggs. [3]

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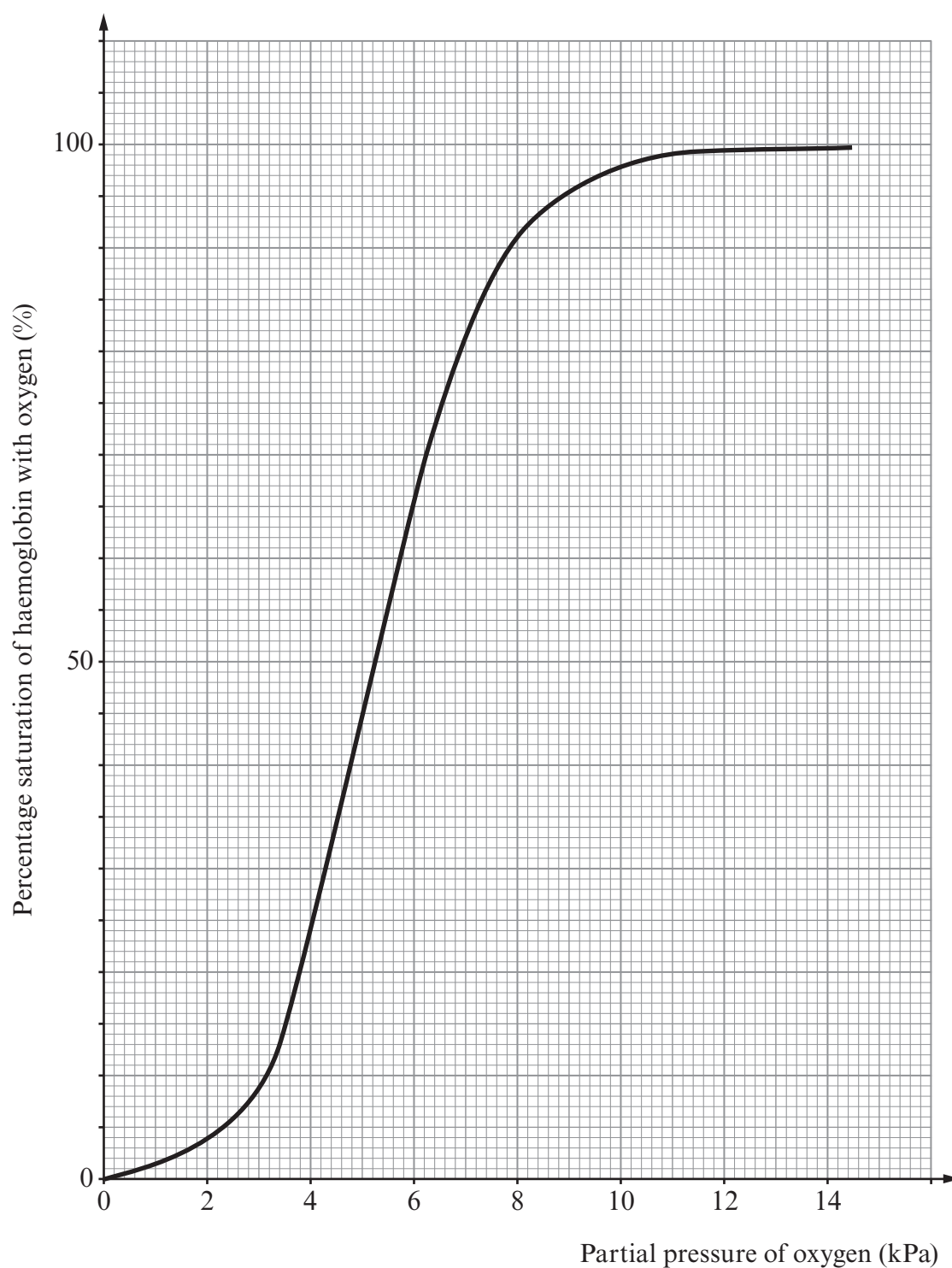
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5. The graph below shows the relationship between partial pressure of oxygen and the percentage saturation of haemoglobin in the blood of a human **adult**.

(a) (i) State the name given to the curve shown on the graph below. [1]

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(ii) Draw another curve on the axes below showing the relationship for **human foetal** haemoglobin. [1]



- (iii) Explain the advantage of the position of the curve for **human foetal** haemoglobin. [2]

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- (b) (i) What would happen to the curve for adult haemoglobin if the partial pressure of carbon dioxide increased? [1]

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- (ii) What is the name of this effect? [1]

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- (iii) Explain the mechanism and the significance of this effect during exercise. [4]

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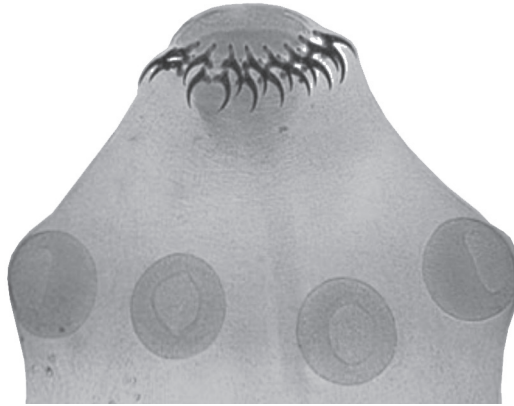
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6. The photograph below shows the scolex (head region) of an adult tapeworm (*Taenia solium*).



[www.k-state.edu, original photograph by S.J. Upton]

- (a) Define the term *parasite*.

[2]

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- (b) (i) Identify **two** structures shown in the photograph above which are adaptations to allow the tapeworm to survive in the gut of a human. [1]

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- (ii) Explain how the **two** structures you have identified in part (b)(i) help the adult tapeworm to survive. [2]

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(c) Tapeworms have no mouth or digestive system.

State why the adult tape worm does not need a digestive system and explain how the tape-like shape of the worm's body enables it to feed without a mouth or gut. [3]

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(d) Describe how the tapeworm's reproductive strategy helps to ensure its survival. [2]

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Any diagram included in your answer must be fully annotated.

Or (b) Describe how the sequence of events that takes place during the cardiac cycle is initiated and controlled. [10]

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